HIGH PERFORMANCE CAR AUDIO
AMPLIFIERS, SIGNAL PROCESSORS
AND LOUDSPEAKERS.
MADE IN THE USA.

MADE IN THE USA

ORION™
HIGH PERFORMANCE CAR AUDIO

©1995 ORION Industries, Incorporated
9235 S. McKemy St., Tempe, Arizona 85284
Phone: 602.705.5600 Fax: 602.705.5788

One of the ADST family of companies.

Part # 8900-0103

2100 HCCA
POWER AMPLIFIER
INSTALLATION MANUAL

ORION™
HIGH PERFORMANCE CAR AUDIO

TABLE OF CONTENTS

INTRODUCTION

6

ACCESSORIES TO MAKE IT BETTER

7-8

TECHNICAL DESIGN

9

SYSTEM PLANNING

10

INSTALLATION

11-19

ADJUSTING THE SOUND OF THE SYSTEM

20

TROUBLESHOOTING

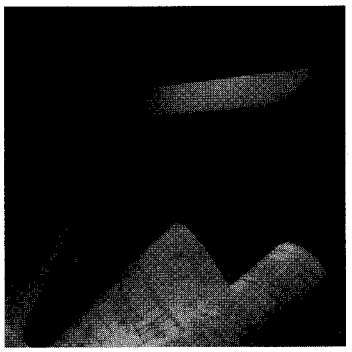
21

SPECIFICATIONS

22

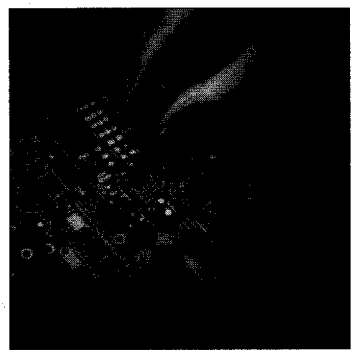
WARRANTY INFORMATION

23



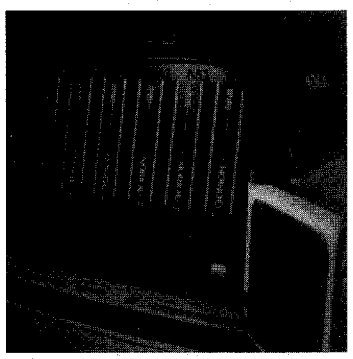
DESIGN

All ORION amplifiers are designed on our sophisticated CAD system, utilizing the latest technology available.



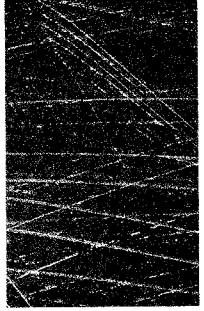
PRODUCTION

All ORION amplifiers are made in the USA, with high-quality, double-sided PC boards containing superior-grade components.



PRODUCT USE

The ORION HCCA Series sets new standards for performance and reliability. They can attain sound pressure levels well in excess of 130 dB. Use common sense, and wear hearing protection when appropriate.



WARNING !!! CLASSIFIED INFORMATION!! DO NOT READ!!

If you hate reading manuals, please read the Installation section of this manual. We took great care in writing this manual. We have very important information that can make this awesome amplifier really perform. If you choose not to read this information-packed manual, the audio gremlins are sure to haunt your system, giving constant reminder of the foolishness of your decision.

PRACTICE SAFE SOUND

CONTINUOUS EXPOSURE TO SOUND PRESSURE LEVELS OVER 100 dB MAY CAUSE PERMANENT HEARING LOSS. HIGH POWERED AUTOMOTIVE SOUND SYSTEMS CAN GENERATE SOUND PRESSURE LEVELS IN EXCESS OF 130 dB. FOR AN ORION POWERED SYSTEM, THIS IS REAL EASY. WHEN PLAYING YOUR SYSTEM AT HIGH SPL LEVELS, PLEASE USE HEARING PROTECTION AND PREVENT LONG TERM EXPOSURE.

Serial Number: _____

Model Number: _____

Date of Purchase: _____

INTRODUCTION

Congratulations! You have purchased the result of years of tedious field research and experimentation. The ORION HCCA 2100 amplifier is hand built and thoroughly tested to ensure it will perform under the most demanding situations. Our five step quality control process along with our 2 hour burn-in guarantees the best sounding, most reliable amplifier in the known galaxy.

We at Orion strive to give you all the latest and up to date information about this product. What we can't give you in this manual is personal installation or technical experience. If you have questions concerning the use or application of this product, please refer to the nearest Authorized Orion Dealer for assistance.

We at Orion also provide technical assistance from our technical gurus. If these people cannot answer your questions, then it is time to climb that hill and pray for that mystic vision. The direct access to our technical support is 1-800-315-2052.

WHAT'S IN THE BOX

Included in this box are all the necessary mounting hardware and cables for your basic installation. Listed below is a detailed list of the components included in this system package.

QUALITY DESCRIPTION

1	Power amplifier Installation Manual
1	HCCA 2100 Amplifier
1	Fused female speaker plug pigtail harness
1	50 amp Circuit Breaker
2	2 ft. section of Wired 4 gauge power cable (red jacket)
1	2 ft. section of Wired 4 Gauge Ground Cable (black jacket)
4	Metal, self-tapping Phillips screws

ACCESSORIES TO MAKE IT BETTER

To finish the installation of the HCCA 2100, you need installation accessories designed to maximize its performance. To accomplish this we have created a division of Orion, Wired! , for your accessory needs. Following are just some of the accessories available to make your awesome system even better.

- **XTREME 4 AWG Power and Ground Cable-** These 4 Gauge power wires have 413 strands of oxygen free copper for the maximum in current delivery and corrosion protection.
- **XTREME Speaker Wire-** 10 AWG, 12 AWG and 16 AWG sizes available. These speaker wires have from 26 strands of oxygen free copper (16 AWG) to 105 strands (10 AWG) for the maximum delivery in sonic integrity.
- **MBR 70 Multiple Battery Regulator-** The MBR 70 is a smart battery regulator/isolator that senses and regulates the voltage of the vehicle's battery and auxiliary batteries dedicated for the audio system.
- **Modular Fuse Holders**
- **Battery and Ring Terminals-** Battery Clamp & Ring Terminals are gold plated for better corrosion protection and cosmetic appeal. These ring terminals are perfectly suited for power and ground connections with other Wired accessories.
- **Transient Support Capacitors-** Provides extra current needed for maximum performance during extreme musical transients.
- **Audio Interlink Cables (RCA & DIN)**

- **Silencer Damping Material-** For improved sound quality and increased dynamic range, install our cold and heat resistant vibro-acoustic damping material in door panels, trunk lids, floor boards and any other noise/ vibrations inducing problem areas.

Other accessories are available for all automotive installation needs. Please refer to your local Authorized Orion Dealer for more information on the amazing possibilities.

TECHNICAL DESIGN FEATURES

The ORION HCCA 2100 is a statement of engineering excellence. Conceived with no boundaries, the performance capabilities of the HCCA 2100 is limited only to your imagination. No form of reality was left unexplored in the development of this amplifier. Free from the constraints of textbook engineering, our engineering DREAM TEAM developed the best sounding most powerful two channel amplifier in our known cosmic dimension. Listed below are just a few features (ORION unclassified secrets) incorporated in the HCCA 2100 to achieve this performance level only available from ORION.

- **DUAL PRS MOSFET Power Supplies (Pulse Regulated Supply)-** This is the heart of the amplifier's performance capabilities. The PRS Supply was developed by ORION to free the amplifier from the constraints that is common with the PWM (Pulse Width Modulated) Supply. This proprietary power supply design is so advanced, textbook engineers cannot understand how it works. So much for their ability. The advantage of the PRS supply is that it has extremely fast reaction time, low output impedance for superior damping control and stability during voltage fluctuations for reliable performance in the harsh automotive environment.

- **15V Phantom Power Supply-** Supplies Phantom Power for ORION accessories. On board power supplies for ORION external signal processors eliminate ground loops between amplifier and signal processors. This ensures noise free maximum dynamic performance from all accessories. Power supplies are protected from excessive current and low voltage situations

- **Built-in Equalization - Circuit-**Compensates for frequency imbalance created by the interior of the vehicle. The bass is boosted at 40 Hz by 15 dB, mid-bass boom is cut at 200 Hz by 4 dB and high frequencies are boosted by 6 dB at 10 kHz to compensate for the high frequency absorption of the vehicle's upholstery.

- **Left and Right Peak Indicators** -Used in conjunction with the input sensitivity control to match the amplifier's peak output with the maximum undistorted output available from the source unit.

- **Parallel RCA and DIN Inputs-**Provide considerable versatility for inter-connection between ORION signal processors and other ORION amplifiers.

- **Complimentary Bi-Polar Matched Outputs-**Matched outputs have less distortion and better sound quality. Thermal stability is improved as heat is dissipated from the devices more evenly.

SYSTEM PLANNING

The most important part of your amplifier installation is system planning. By deciding on a system plan, you can accurately determine the configuration of your amplifier wiring. To assist you in your system planning, we provide you with the performance capabilities of the HCCA 2100 as well as the requirements to maximize the performance of this awesome amplifier. In addition, we have provided several system designs you can choose for your system configuration.

The HCCA 2100 is not your ordinary two channel amplifier. Its power rating of 100 watts per channel into 4Ω stereo, 800 watts mono, is typically more power than ordinary speakers can handle. Although the HCCA 2100 has been optimized for low frequency reproduction, it makes an awesome full-range amplifier or high-frequency amplifier. When using the amplifier for full-range or low frequency applications, the current demand of the amplifier can sometimes exceed the capabilities of the factory electrical system. We at ORION highly recommend the use of the MBR 70 Battery Regulator and an extra battery with the use of the Wired transient support capacitor to achieve maximum performance. Adding these accessories will ensure the reliable performance of the amplifier.

INSTALLATION

Releasing the potential of the HCCA 2100 will depend directly on the quality of the installation. Care taken during the installation process will be rewarded with years of satisfying performance. If you are unsure about your installation capabilities, please refer to your local Authorized Orion Dealer for technical assistance. Orion Dealer's are trained professionals dedicated to extracting the maximum performance out of your Orion system.

Please read the entire installation section before starting. This will help you avoid meltdowns, brownouts, strange clouds of smoke and other atrocities your friends will never let you live down.

TOOLS FOR THE TRADE

Listed are the majority of the tools required to perform the installation. Having the proper tools will make the installation that much easier. It is very difficult when you get half way through the installation and discover that you require a much desired tool to get yourself though a particular part of the installation. This problem can be magnified by the disappearance of your Mac Guyver friend that, if necessary, could make plastic explosives out of a match, candy bar and aluminum foil. So much for the lecture. Some of these tools are necessities. Some make the job much easier.

Electric Drill with assorted drill bits
Utility Knife
Phillips and Flat blade screw drivers
Pliers (standard and needle nose)
Wire brush or emory sandpaper for chassis grounding
Solder Iron and Solder
Grommets
Heat shrink tubing
Nylon Tie straps
Volt Ohm Meter (Optional)
Wire Cutters
Wire Crimpers
Wire Strippers

TOP TEN INSTALLATION TIPS TO AVOID RIDICULE FROM YOUR FRIENDS

① DO NOT mount the amplifier upside down. This prevents the amplifiers ability to dissipate heat.

② DO NOT wire the amplifier to any part of the factory fuse block. Do this if you enjoy replacing fuses on the side of the road.

③ DO NOT mount the amplifier in the engine compartment. The amplifier does not perform well when exposed to the outer elements created by mother nature.

④ DO NOT make power connections to the amplifier while the battery ground is connected to the vehicle electrical system. This could generate big sparks which will just ruin the gold plate finish on your wired terminal connectors.

⑤ DO NOT Drill or mount any part of the amplifier or its power connections or anything, for that matter, to the following: fuel lines, gas tank, brake lines, radiator (if you avoid number 3 this should be impossible), battery, outside body panels air conditioning, any glass surface and so on. In other words, THINK BEFORE YOU DRILL! This is most important when considering that your vehicle is your second largest purchase the average household will make. A good rule of thumb would be to ask yourself: would your significant other mind if you did this to your house? If the answer is yes, then DON'T DO IT!

⑥ DO NOT block the fan inlet and exhaust for the amplifier. This would be like putting a plastic bag over your head. Great party fun but difficult to drive home with.

⑦ DO NOT use the amplifier as a major structural support in your vehicle. This amplifier is known for its performance capabilities not for its capabilities as a load bearing member.

⑧ DO NOT Ground the amplifier to the seat bolt or any other pre-drilled or fabricated location. These fasteners were designed to mount things, not for electrical connections. For best grounding, find a location on the chassis as close to the amplifier as possible, remove any paint or other electrically limiting materials and bolt the amplifier ground wire with an eyelet to the chassis of the vehicle. This will ensure years of trouble free performance.

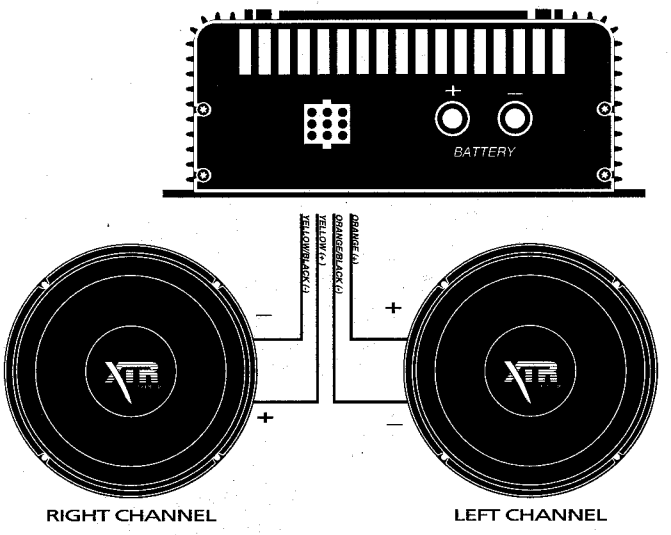
⑨ DO NOT ground wires other than the power ground to the chassis of the vehicle. This can result in blown fuses, unwanted noises in the audio signal, and amplifier overheating.

⑩ DO NOT use ORION amplifiers with other manufacturer amplifiers. Not using an ORION amplifier is probably the easiest way to be ridiculed by your friends.

STEREO MODE

STEREO WIRING

- Lowest recommended impedance 1Ω per channel stereo.
- Mono button push in for summed stereo operation.



BRIDGING

All ORION amplifiers can be bridged by combining the power from the left and right channels to have one larger channel of amplification. The output capability is double the amount of a single stereo channel. ORION amplifiers can be bridged to a single mono channel or mixed-mono for satellite and subwoofer applications.

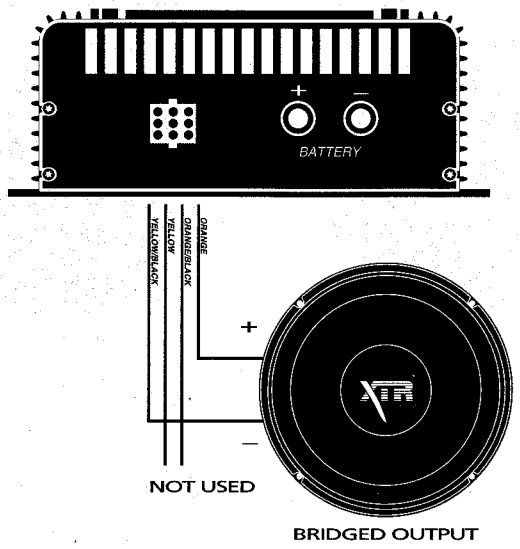
MONO MODE 1 CHANNEL WIRING

- Output can be configured left, right or mono output.
- The lowest recommended impedance is 2Ω bridged mono.

MONO MODE 1 CHANNEL

Use the left positive and the right negative speaker outputs.

Note: Any time you bridge an amplifier, each channel "sees" half the impedance of the actual speaker load. For example if you bridge a single 4-ohm speaker each channel will "see" a 2-ohm load. In this configuration we recommend that you sum the left and right inputs to mono by depressing the mono button on the RCA side of the amplifier.



FINDING A HOME FOR THE HCCA 2100

The location of your amplifier will depend on several important issues. Due to the nature and size of the amplifer, installation locations will most likely be limited. With any amplifier, there are several possible mounting locations and configurations that can be optimal. We will cover the most obvious of situations.

PASSENGER COMPARTMENT MOUNTING

If you are going to mount the amplifier in the passenger compartment, make sure you have adequate room for ventilation. The HCCA 2100 has its own internal cooling system. To maximize its performance, do not restrict the airflow around the fan inlet or the exhaust. Keep a minimum of one inch of clearance around the amplifier for adequate cooling.

TRUNK COMPARTMENT MOUNTING

Mounting the HCCA 2100 in the trunk of the vehicle will provide excellent performance as long as you do not mount the amplifier upside down or restrict the airflow of either the fan inlet or the exhaust. As this is a very large amplifier, make sure the location you have chosen will provide adequate support for the weight of the amplifier.

ENGINE COMPARTMENT MOUNTING

The HCCA 2100 should NEVER repeat NEVER be mounted in the engine compartment. Failure to obey this warning will result in the void of your warranty and the harassment from your closest friends.

POWER AND SPEAKER CONNECTIONS

Power and ground connection is made via the 4-ga. power connector. The ground wire should be as short as possible and grounded to the chassis of the vehicle. Do not use a self-tapping screw for the ground connection. A loose connection can cause resistance in the circuit and overheat the amplifier. A bolt, nut, and washers are recommended.

POWER CONNECTIONS

- 4-gauge wire used for both the power and ground wire.
- Fuse holder as close a possible to the battery, less than 18"
- Add additional ground wire to battery equal to the power wire used for B+ of the amplifier.

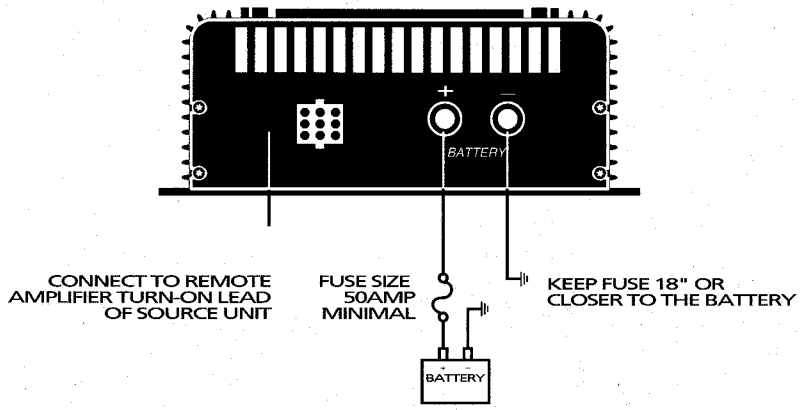
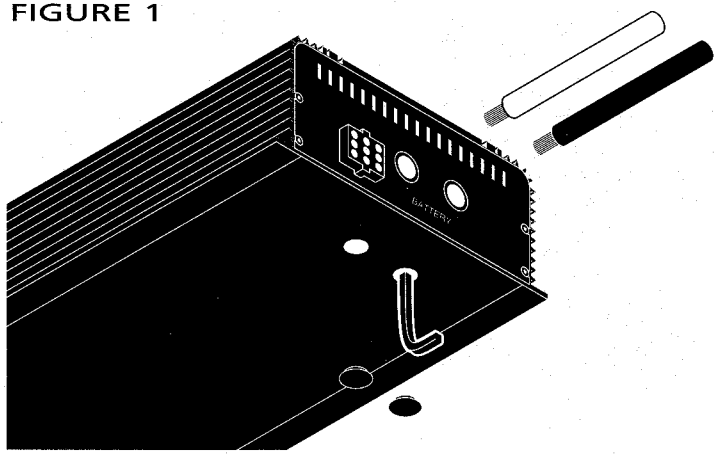


FIGURE 1

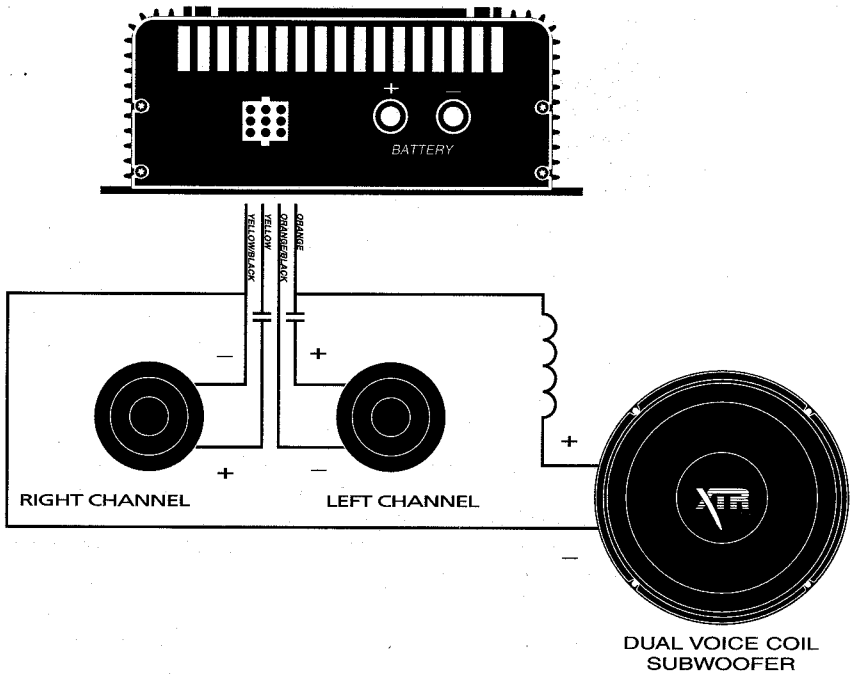


MIXED MONO WIRING

- Passive Crossover Frequencies must not overlap!
- The lowest recommended impedance is 1Ω per channel stereo.
- The lowest recommended impedance is 2Ω bridged mono.

MIXED-MONO

In this configuration the woofer is run in mono and the left and right speakers are in stereo. The stereo speakers are wired normally and the woofer is wired using the right negative and left positive speaker terminals. Be sure to use the correct passive crossovers when using this configuration. Capacitors are needed for the left and right speakers and a coil is needed for the woofer.



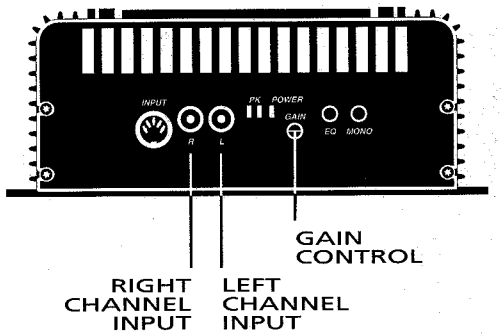
DUAL VOICE COIL SUBWOOFER

WHAT TYPE OF INPUTS AND OUTPUTS CAN BE USED?

- There are three different ways you can get signal to your amplifier: RCA, DIN and High-Level Input. Regardless of your source unit, ORION has provided an input configuration to maximize the performance of your system. You can also use different combinations of RCA, DIN and High-Level Inputs and Outputs. Listed are different ways to get audio signal in and out of your amplifier.

RCA INPUTS AND OUTPUTS CONFIGURATION

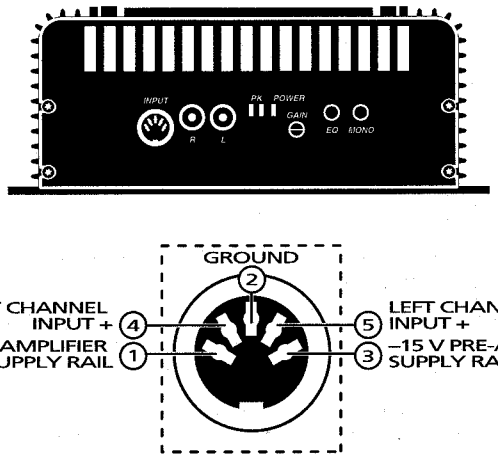
- RCA signal input range to make full power: 150mV RMS to 5 V RMS.
- RCA left and right inputs are the main inputs for the amplifier.
- Mono button is for mono low frequency operation.
- EQ button engages built-in equalization of +15dB at 40Hz, -4dB at 200Hz and +6dB at 10kHz.

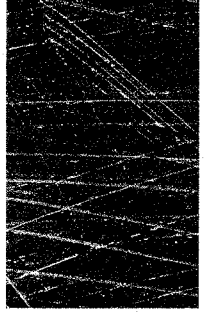


Note: Gain Control is used to match output from source unit to amplifier sensitivity. This is not a volume control. Properly adjusting the gain control is explained in the "adjusting the sound of the system" section in this manual.

DIN INPUTS, OUTPUTS AND PHANTOM POWER

- DIN signal input range to make full power: 150mV RMS to 5 V RMS.
- DIN AUX is programmable.
- DIN output is paralleled with RCA input.
- 15 Volt Rails can supply "Phantom Power" to ORION accessories.
- Ground is used for power ground for Phantom Power and audio ground for both DIN audio input and outputs.





ADJUSTING THE SOUND OF THE SYSTEM

You will get less system noise if you keep the amplifier gain as low as possible. This can be accomplished best with a preamp, such as the ORION 300 PSW.

If there are no accessories (equalizers, crossovers, etc.) used in the system:

1. Turn off all power.
2. Set the Gain controls on all amplifiers to their minimum position.
3. Turn on the power to the amplifiers. Turn on the radio and set the Volume control to approximately ¾ volume.
4. Adjust the Gain control on each amplifier until the system is at full output, just below clipping.
5. Set the Volume control on the radio for desired listening level.

If ORION accessories are being used:

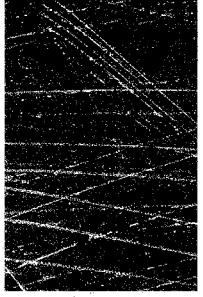
1. Turn all power off.
2. Set the gain controls on all amplifiers to their minimum positions.
3. Set all frequency controls on the 300 PSW Equalizer and the boost/cut controls to the center position.
4. If a 300 PSW is being used, set both input controls to minimum (fully counterclockwise) and the volume control to maximum (fully clockwise).
5. Turn on power to amplifiers. Turn on the radio and set the Volume control for approximately ¾ volume.
6. Adjust each input gain control on the pre-amp until the system is at full output just below clipping. If the input gain controls on the pre-amp do not produce full volume, increase the gain setting of each amplifier as required to realized full output.

CAUTION: Be Sure To Turn Off The Power When Disconnecting And Re-connecting

TROUBLESHOOTING GUIDE

This section provides you with a catalog of amplifier symptoms and their probable causes and solutions. Before you consult this listing, make sure the vehicle's electrical system is working properly by verifying that other electrical items (e.g. headlights, windows, etc.) still function correctly.

Symptom	Probable Cause	Solution
No Audio	Low or No Remote Turn-On connections	Check remote turn-on voltage at amp and head unit
	Blown Fuse	Replace with new fast-blow fuse
	Power wires not connected	Check butt splices or solder joints;check Ground and Battery connections
	Blown speakers or not connected	Use VOM or DVM to measure speaker coil impedance; check speaker wiring connections
Audio cycles on and off	Thermal Protection Circuits are properly shutting amplifier off each time it gets too hot	Check location for adequate ventilation; check speaker wiring for a short to chassis
Distorted Audio	Input Sensitivity not set properly and or damaged speaker's	Calibrating Input Sensitivity procedure check each step; inspect each speaker for damage and repair or replace suspected component
	Low turn-on voltage	Refer to head unit owner's manual
Audio level low	Mute circuit is on	Check electrical system for low voltage; check speaker ground connection
Poor bass response	Speakers wired with wrong polarity, causing cancellation of bass frequencies; low voltage	Check polarity of wires from amplifiers to each speaker as defined by the system; check battery connections
External fuse blowing	Incorrect wiring or short circuit; abuse; damaged speakers.	Check Electrical Installation



SPECIFICATIONS

Model	**HCCA 2100**
Output Power per channel, all channels driven @12 V	100 x 2 into 4Ω 200 x 2 into 2Ω 400 x 2 into 1Ω 400 x 1 into 4Ω 800 x 1 into 2Ω
Distortion maximum at 4 Ω, 20 to 20kHz	0.03%
Frequency Response ±0.5 dB	6Hz to 30 kHz
Signal to Noise	100dB
Input Impedance	10,000 Ohms
Input Sensitivity	150mV to 5 Volts
Output Load (stereo)	2Ω to 8Ω
Current Draw	20 Amps to 120 Amps
Fuse Size	Dual 30 Amp AGU
Damping Factor	Greater than 200
Slew Rate	30 Volts per µsec
Stereo Separation	70dB
Size (LxWxH)	23" x 8" x 3.13" 584mm x 203mm x 80mm

IN REALLY SMALL PRINT

As we are always finding new ways to improve our product, the features and specifications are subject to change without notice. At least, as far as you will know.

WARRANTY & SERVICE

ORION Industries Inc. warrants this product to be free from defects in material and workmanship under the following terms:

Parts and Labor are warranted for a period of **3 years** IF:

a. The product is purchased from an Authorized ORION Dealer
b. The product is installed by an Authorized ORION Dealer

Parts and Labor are warranted for a period of **1 year** IF:

a. The product is purchased from an Authorized ORION Dealer
b. The product is NOT installed by an Authorized ORION Dealer

Parts and Labor are warranted for a period of **90 days** IF:

a. The product is NOT purchased from an Authorized ORION Dealer

If you are uncertain as to whether your dealer is authorized, please contact ORION at 1-800-775-7150 or (602) 705-5600. In countries other than the USA, each distributor warrantees the ORION product it sells.

The Following conditions and situations are **NOT** covered by this warranty:

Any product on which the serial number has been defaced, modified or removed, Damage or malfunction resulting from:

a. Accident, misuse, abuse, unauthorized modification or failure to follow the instructions provided with this product.
b. Repair by anyone NOT authorized by ORION.
c. Damage due to shipping (these claims must be presented to the freight carrier)
d. Removal or installation of this product.
e. Any failure that has NOT been caused by a defect in material or workmanship.

This warranty is in effect for the original purchaser only. ORION will pay for labor and material expense for covered items. ORION does not cover removal or installation charges, payment of shipping charges to ORION, payment of OUT-OF-WARRANTY shipping charges, or damage to other property caused by any defects in this product.

For IN-WARRANTY service, you must include a copy of the original, dated sales receipt, including serial number, from an Authorized ORION Dealer. Please also enclose your name, return street address (No P.O. Boxes) and a detailed description of the problem.

For out-of-warranty products, please include an ORION E-Z Repair Form. These are available by contacting ORION Repair at 1-888-362-5283 or (602) 705-5600 and ask for the Repair Department.

- If you do not have the original packaging, the product must be packaged to prevent damage during shipment.
- When sending in a product for service or repair, **please write down the serial number**, you will need this for future reference.
- It is not necessary to send your plugs with the amplifier.

ORION Industries, Inc.
ATTN: Repair Department
9235 South McKemy Street
Tempe, Arizona 85284 USA

Exclusion

1. This warranty is in lieu of all other warranties expressed or implied.
2. In no event will ORION be liable for any consequential damages resulting from the use of this product or any defect of this product.

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.